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APPLICATION FOR LETTERS PATENT FOR:

ENGINE BLOCK HEATER SYSTEM AND METHOD OF OPERATION

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## ENGINE BLOCK HEATER SYSTEM AND METHOD OF OPERATION

### BACKGROUND OF THE INVENTION

#### 1. Field Of The Invention

5           The present invention generally relates to engine block heaters that are used to keep the engine of an automobile warm when the automobile is not running. More particularly, the present invention relates to engine block heaters with safety features that are 10 intended to prevent the automobile from being used while the engine block heater is in operation.

#### 2. Description Of The Prior Art

15           In many areas of the world, temperatures fall well below freezing for many months out of the year. In many such locations, there are days when temperatures dip below zero degrees Fahrenheit. During such extreme cold weather, it is difficult to start an engine of a typical stock-model automobile. In such 20 extreme cold weather, the power of the automobile's battery is diminished. Furthermore, the oil in the engine becomes highly viscous and thus the crankshaft becomes hard to turn. The temperature weakened battery often lacks the power needed to turn an engine through

the thick oil and the engine fails to start. The cold weather also greatly affects the ability of diesel engines to cause combustion. In extreme cold weather, many commercial diesel engines lack the starting power needed to create enough engine compression to ignite the diesel fuel and start the engine.

In areas where extreme cold temperatures are common, many people keep their automobiles in heated garages. However, not everyone has access to a heated garage. Many times such people use block heaters in their automobiles. Block heaters are electrical heating elements that heat the oil and liquid coolant contained within the automobile's engine. By heating the oil and the engine coolant, the oil is kept thin and the coolant unfrozen. The engine can therefore be started easily regardless of the outside temperature.

Traditional block heaters are electrically powered and require that an electrical extension cord lead to the engine of the automobile. A problem occurs when people forget to disconnect the electrical cord that powers the block heater and drive the automobile while the electrical cord is still connected. When this happens, the electrical cord pulls taut and violently disconnects. This often causes damage to the

automobile, the electrical receptacle and/or the cord connecting the automobile to the electrical receptacle.

Over the years, various systems have been

5 developed to inform a driver that the vehicle they have entered contains an electrical block heater and is currently plugged into a receptacle with an extension cord. For instance, in U.S. Patent No. 3,744,046 to Tamasi, entitled Engine Heater Monitor  
10 And Control System, a system is shown that uses different colored lights to inform a driver about the status of a block heater. Similar systems are shown in U.S. Patent No. 5,115,116 to Reed, entitled Vehicle Preheating System and U.S. Patent No. 6,225,893 to  
15 Caissia, entitled Alarm System For Engine Block Heater. In both the Reed patent and the Caissia patent, systems are shown that provide alarm signals if the automobile is started while the engine block heater is still engaged.

20 A problem associated with the prior art systems is that a person who is in a hurry may start an automobile and drive the vehicle a few feet before they notice an alarm light or alarm signal. This is particularly true if the automobile is parked in a

garage and a person is turned to look backwards as  
they back the automobile out of the garage. By the  
time a person turns to see a warning light on a  
dashboard, a person may have already caused serious  
5 damage to the automobile, the wall power receptacle  
and/or the cord that leads to the engine block heater.

A need therefore exists for an improved engine  
block heater system that prevents the automobile from  
being started when the engine block heater is in  
10 operation. In this manner, the automobile cannot be  
inadvertently driven away while the engine block  
heater is still connected to an outlet. Furthermore,  
by preventing the automobile from starting while the  
engine block heater is in use, the driver of the  
15 automobile is provided with the ultimate reminder to  
disconnect the engine block heater from the  
automobile.

#### SUMMARY OF THE INVENTION

20 The present invention is an engine block heating  
system for a vehicle and the associated method of its  
operation. The engine block heating system has an  
electrical heating element that is coupled to the  
vehicle's engine. A power cord is provided for

supplying electricity to the electrical heating element from an electrical power source external to the vehicle. The power cord is attached to the vehicle when the engine block heater is in use and is detached from the vehicle when the vehicle is to be driven.

A sensor is provided in the system for detecting whether or not the power cord is connected to the vehicle and is providing power to the electrical heating element. A disruption switch is coupled to both the starting circuit of the vehicle and the sensor. The disruption switch disrupts the starting circuit of the vehicle when the sensor detects that the power cord is connected to the vehicle. As such, the vehicle cannot be started when the power cord of the engine block heating system is attached to the vehicle. This prevents the vehicle from being accidentally driven while connected to an external power cord.

**20 BRIEF DESCRIPTION OF THE DRAWINGS**

For a better understanding of the present invention, reference is made to the following description of an exemplary embodiment thereof, considered in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of an automobile containing an exemplary embodiment of the present invention engine block heating system; and

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Fig. 2 is a schematic of the exemplary embodiment of the present invention engine block heating system described in Fig. 1.

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#### DETAILED DESCRIPTION OF THE DRAWINGS

Although the present invention system can be applied to any internal combustion engine with an electrical starter, such as an airplane, tractor or snowmobile, the present invention system is particularly well suited for use on automobiles.

Accordingly, by way of example, the present invention system will be described as being applied to an automobile in order to set forth the best mode contemplated for the present invention system.

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However, the application of the present invention system to an automobile should not be considered a limitation of the application of the present invention system to other motorized vehicles or machinery.

Referring to Fig. 1, there is shown a typical automobile 10. The automobile 10 has an engine 12 that is initially started using an electrical starter motor 11. The electrical starter motor 11 is coupled to a starting relay 14. The starting relay 14 is connected to the key ignition of the automobile 10 and the battery 16 of the automobile 10. When the key ignition is turned, the starter relay 14 connects power from the battery 16 to the electrical starter motor 11, thereby turning and starting the engine 12.

Attached to the engine 12 of the automobile 10 is at least one electrical heating element 32. The heating element is often a plug that is inserted into a bore in the block of the engine 12 near the oil pan of the engine 12. The heating element 32 is attached to a switch relay 22. The switch relay 22 is attached to a connector port 24 that is positioned on or within the front grill of the automobile 10.

A power cord 26 is provided. The power cord 26 is selectively connectable to the connector port 24, wherein the power cord 26 interconnects the connector port 24 with a wall receptacle 28.

Referring to Fig. 2, it can be seen that within the connector port 24 is located a sensor 30. The

sensor 30 detects when the connector port 24 is attached to the power cord 26 and when the connector port 24 is not attached to the power cord 26. The physical interconnection between the connector port 24 and the power cord 26 is sensed. Thus, the sensor 30 will still detect if the power cord 26 is connected to the connector port 24 even if the power cord 26 itself is not plugged into a wall receptacle 28.

The connector port 24 receives the power cord 26 and directly connects the power cord 26 to the block heating elements 32, via a cable 34. Thus, when the power cord 26 is connected to the connector port 24 and is plugged into a wall receptacle 28, power is available for the heating elements 32.

The switch relay 22 is selectively activated and deactivated by the connection and disconnection of the power cord 26 to the connector port 24. The switch relay 22 contains an input terminal 36 and an output terminal 38. The input terminal 36 and the output terminal 38 are connected and disconnected by the workings of the switch relay 22. When the sensor 30 in the connector port 24 detects that the power cord 26 has been connected to the connector port 24, the switch relay 22 opens the connection between the input

terminal 36 and the output terminal 38. Thus, there is no electrical interconnection between the input terminal 36 and the output terminal 38. However, when the power cord 26 is removed from the connector port 5 24, the sensor 30 detects the removal of the power cord 26 and changes the condition state of the switch relay 22. The switch relay 22 then connects the input terminal 36 to the output terminal 38.

The input terminal 36 and the output terminal 38 of the switch relay 22 are connected to one of the electrical cables that run to the starting relay 14 (Fig. 1) of the automobile 10 (Fig. 1). The switch relay 22 can be placed in series along any cable that is part of the automobile's starter circuit. This 15 includes, but is not limited to, any cable that connects the battery to the starter relay or any cable that connects the ignition to the starter relay. By disrupting the flow of electricity in any of these cables, the automobile can be prevented from starting 20 by the switch relay 22 of the present invention system 20.

It will therefore be understood, that when the power cord 26 is connected to the connector port 24 of the present invention system 20, the switch relay 22

is activated and the circuitry used to start the automobile is disrupted. Thus, the automobile cannot be started when the power cord 26 is connected to the automobile. As soon as the power cord 26 is disconnected from the connector port 24, the starter circuitry of the automobile operates normally and the automobile can be started. The present invention system 20, therefore, prevents the automobile from being started when the power cord 26 is connected to the connector port 24 on the automobile.

The switch relay 22 of the present invention system 20 can also control a secondary function. The switch relay 22 can contain a second switch 40 that is also selectively opened and closed by the power cord sensor 30 in the connector port 24. The second switch 40 is connected to a terminal connection 42 that can be connected to the engine computer of the automobile via a connecting cable. By selectively opening and closing the second switch 40 in the switch relay 22, the switch relay 22 can cause the engine computer to generate a warning within the automobile. The warning may be the lighting of the "Engine" light within the dashboard, or sounding any alarm buzzer that may be contained within the dashboard. Thus, in addition to

the automobile not starting, the driver sitting in the automobile can be reminded that the engine block heating system is still plugged in by the visual and audible indicators enabled on the dashboard.

5           Alternatively, the second switch 40 of the switch relay 22 can be wired directly to a dashboard light or alarm buzzer. In this manner, the present invention system 20 can fully operate independently of the automobile's engine computer. This enables the present invention system 20 to be installed in automobiles

10           that do not have engine computers with external access ports.

15           In operation, the present invention system 20 is either manufactured into an automobile or is purchased separately and is retroactively added to an automobile. When the automobile is stopped, the power cord 26 can be connected to the automobile to keep the engine warm. As soon as the power cord 26 is attached to the automobile, the starter circuit of the

20           automobile is disabled and the automobile cannot be started. Thus, any person who forgets or is unaware that the automobile is connected to the power cord 26, cannot drive the automobile while it is still connected to the power cord 26.

If the power cord 26 is attached to the automobile, the automobile will not start. Furthermore, when the key is placed in the ignition of the automobile, the driver is presented with a warning light and/or alarm buzzer that further informs the driver that the automobile is not ready to be driven. Once the driver disconnects the power cord 26 from the automobile, the automobile automatically reverts back to its normal operating condition.

It will be understood that the embodiment of the present invention system illustrated and described is merely exemplary and that the shown schematic can be altered in many obvious ways. For example, the switch relay illustrated can be replaced with a solid state circuit containing transistors. The structure of the switch relay would therefore be different, but its function would remain the same. Furthermore, the switch relay 22 can be connected to many other circuits within the automobile instead of the starter circuit. For instance, the switch relay 22 can be coupled to the ignition coil of the automobile so that it prevents the ignition coil from working when the power cord 26 is in place. There are many other components, such as fuel injection components that can

be coupled to the switch relay 22 to prevent the automobile from starting. The switch relay 22 of the present invention can be coupled to any such component in the implementation of the present invention to a specific model of automobile. All such alternate embodiments are intended to be included in the scope of the present invention as defined by the following claims.